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Chapter 1 PROBLEM SOLVING

1) How many possible solutions are there for a problem?
(a) 1 (b) 2 (c) 3 (d) Many

2) During the analysis process, a problem is decomposed into how many sub problems?
(a) Multiple (b) Infinite (c) Four (d) No division

3) Which of them is sum of program?
(a) Instructions (b) Information (c) Data (d) None

4) How many steps to solve any kind of problem?
(a) 5 (b) 7 (c) 9 (d) 11

5) Programming can be best describe as
(a) Problem solving (b) Virus (c) Application program (d) All

6) First of all problem must be clearly
(a) Solved (b) Identified (c) Think (d) Brief

7) Symbol of connector
(a) (b) (c) (d)

8) The technique to divide the main problem into sub problems is called
(a) Top-Down Design (b) Divide and Conquer Rule
(c) Algorithm (d) Both a & b

9) Computer cannot find these errors
(a) Syntax (b) Logical (c) Execution (d) Runtime

10) What is the sequence of developing a program?
(i) Coding (ii) Designing (iii) Analysis (iv) Testing (v) Identification of problem
(a) i,ii,iii,iv,v (b) iii,ii,v,i,iv (c) v,iii,ii,i,iv (d) None

11) After designing a program coding can be done
(a) Only in C++ language (b) In any computer language
(c) In BASIC (d) In VB

12) In which block in a flow chart we can write X = YZ
(a) Comparison block (b) Process block (c) I / O block (d) Can not write

13) Input/Output
(a) (b) (c) (d)

14) Set of instruction to solve a problem is called
(a) Analysis (b) Algorithm (c) Program (d) None

15) The process of writing instructions in programming language is called
(a) Debugging (b) Coding (c) Solving (d) Programming

16) Which of the following error is detected at compile time of program?
(a) Runtime (b) Syntax (c) Logical (d) Both a & b

17) To help the programmer during execution of the program
(a) Maintenance (b) Documentation (c) Flow Chart (d) Algorithm

18) The grammatical rules of a programming language to write program are referred to as
(a) Programming language
(b) Logic of the programming language
(c) Rules of the programming language
(d) Syntax of the programming language

19) Errors in the program is called
(a) Debugging (b) Bugs (c) Testing (d) None

20) An algorithm is
(a) Generic type (b) Language specific (c) For analysis (d) None

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21) Diamond symbol is used for
(a) Start (b) Flow line (c) Decision (d) Input/output

22) PL stands for
(a) Programming language (b) Programming Layout
(c) Protocol language (d) None

23) Flow chart is valuable aid in a program
(a) Maintenance (b) Coding (c) Documentation (d) Both a & b

24) Which of the following is syntax error?
(a) 7 = X + Y (b) Z = X + Y (c) X + Y = Z (d) Both a & c

25) Logical errors can only be detected
(a) By thoroughly testing the program
(b) By testing each logical path of the flow of control in the program
(c) By observing all variables in the program
(d) All of these

26) The symbol is used to flow charts to start or stop a process
(a) Rectangle (b) Diamond (c) Oval (d) Parallelogram

27) Which of the following is the process of running the program and finding the errors from the program?
(a) Debugging (b) Bugs (c) Testing (d) None

28) Typographical errors in BASIC statements are
(a) Runtime errors (b) Logical errors (c) Syntax errors (d) Execution errors

29) Division by zero is
(a) Syntax errors (b) Logical errors (c) Execution errors (d) Runtime error

30) Language is easy for the user
(a) Machine (b) High level (c) Assembly (d) None

31) How many types of errors
(a) 1 (b) 2 (c) 3 (d) 4

32) Symbol is sued to show the direction of flow of information in a flow chart
(a) Decision (b) Flow line (c) Process (d) Connector

33) Which of the following errors occur if you write a formula c=a + b in source program instead of c=a* b
(a) Syntax error (b) Logical Error (c) Execution error (d) None

34) Step after development and testing the program is
(a) Booting (b) Debugging (c) Implementation (d) All

35) A symbol is used in flow chart for processing
(a) Diamond (b) Rectangle (c) Oval (d) Flow lines

36) The symbol for decision box is
(a) An oval (b) A diamond (c) A circle (d) A parallelogram

37) Terminal symbol is represented by the shape
(a) Circle (b) Oval (c) Rectangle (d) Parallelogram

38) When a runtime error occurs then
(a) Computer stop the execution of the program and displays an error message
(b) Computer returns wrong output result
(c) Computer continue to execute other statements of program
(d) None

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39) Which of the following is the process of maintaining the program?
(a) Debugging (b) Bugs (c) Testing (d) Maintenance

40) A decision box can have
(a) One exit (b) Two exit (c) Three exit (d) Four exit

41) Data whose result is known in advance
(a) Numeric (b) Test (c) String (d) String variable

42) What is called the processing of finding and removing errors from a computer program?
(a) Programming (b) Debugging (c) Analyzing (d) Documentation

43) The technique "Divide and Conquer" is used to solve
(a) Simple problems (b) Complex problems
(c) Large problems (d) Both b & c

44) Which of the following is similar to the road map or map of a building?
(a) Coding (b) Documentation (c) Flow chart (d) None

45) An error occurs when the program violet one or more grammatical rules of the programming language is called.
(a) Desk checking (b) Syntax (c) Run time (d) Algorithm

46) BASIC is a
(a) HLL (b) LLL (c) Assembly (d) Both b & c

47) Which of the following is refers to the installation of the program in the user environment?
(a) Maintenance (b) Testing (c) Implementation (d) Documentation

48) In which block in a flowchart we can write Print A
(a) Comparison block (b) Process block (c) I/O block (d) None

49) The grammar of the computer language is
(a) Error (b) Sequence (c) Flowchart (d) Syntax

50) Flow line is denoted by the symbol
(a) (b) (c) (d)

ANSWER KEY

1	D	11	B	21	C	31	C	41	B
2	A	12	B	22	A	32	B	42	B
3	A	13	B	23	D	33	B	43	D
4	C	14	C	24	D	34	C	44	C
5	A	15	B	25	D	35	B	45	B
6	B	16	B	26	C	36	B	46	A
7	A	17	B	27	A	37	B	47	C
8	D	18	C	28	C	38	A	48	C
9	B	19	B	29	D	39	D	49	D
10	C	20	D	30	D	40	B	50	A

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Chapter 1 PROBLEM SOLVING

SHORT QUESTIONS

Q1: Define problem solving?

PROBLEM SOLVING

The process to identify the problem and then to prepare the proper logical solution of the problem is known as problem solving.

Q2: What is problem identification?

PROBLME IDENTIFICATION

The problem being solved is observed carefully, so that problem can be understood and major tasks to perform for solution of problem can be identified. The irrelevant if filtered out.

Q3: What is analysis?

ANALYSIS

The process of understanding the problem is called analysis.

Q4: What is top down design or divide and conquer rule.

DIVIDE AND CONQUER RULE

The main problem is divided into sub problems so that each sub problem can be solved. This technique is leads to a best and simple solution of the problem. This technique is known as Top Down Design or Divide and Conquer Rule.

Q5: What is Desk checking?

DESK CHECKING

Desk checking is the process of carefully observing the working of an algorithm on the paper, for some test data. Algorithm is provided a variable set of input for which the output is examined.

Q6: What is Algorithm?

ALGOITHM

The step by step procedure to solve the problem is called algorithm?

Q7: What is flowchart?

Flowchart

It is the pictorial representation of an algorithm.

Q8: What are the limitations of flow chart?

LIMITATION OF FLOWCHART

The limitations of flow chart are given below

1. It is difficult to draw flowcharts for complex problems.
2. If alterations are required the flowchart is to be redrawn.

Q9: What are the advantages of flowchart?

ADVANTAGES OF FLOWCHART

The advantages of flowchart are as follows.

1. The logic of an algorithm can be described more effectively with the help of a flowchart.
2. Maintenance of operational programs becomes easy.
3. The flowchart act as a guide for the program development.
4. The flowchart helps in debugging process.

Q10: Write down any three guidelines to draw a flowchart?

GUIDELINE OF FLOWCHART

The guide lines to draw a flowchart are as follows

1. In drawing a flowchart all necessary requirements should be listed in a logical order.
2. The direction of flowchart from top to bottom.
3. Only one flow lines come out from a process symbol.

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Q11: What is coding?

CODING

The writing of a computer program in any programming language is called coding.

Q12: What is Syntax?

SYNTAX

The grammatical rules of programming language to write programs are referred to as syntax of that programming language.

Q13: What is testing process?

TESTING PROCESS

It is the process to check the program whether the program is working properly or not.

Q14: What is test data?

TEST DATA

Test data is a data whose result is known in advance is called test data.

Q15: What is debugging?

DEBUGGING

The process of finding and removing the error in a program is called debugging?

Q16: What is bug?

BUG

The error in a program is called bug.

Q17: What is syntax error?

SYNTAX ERROR

The errors occur when grammatical rules of programming language are not followed in writing the computer program. These types of errors are detected at compile time of the program. For example

C = A + / B

Q18: What is Logical error?

LOGICAL ERROR

These errors may be due to improper use of the formula or wrong use of the symbols or data for if we write the formula for speed as

V = S X T

Instead V = S / T

The computer is unable to detect such errors and give out wrong result. Logical errors are difficult to find.

Q19: What is Runtime error?

RUNTIME ERROR

The errors that are occurred during the execution of program is called runtime error. For example if a program contains a division of a number by zero. In such case the execution of the program stop during execution.

Q20: What is implementation?

IMPLEMENTATION

Once the program has been tested thoroughly, It must be installed or put into operation at the site where it will be used. This is known as implementation of the program.

Q21: What is program maintain?

PROGRAM MAINTAINANCE

Program maintenance is a process of upgrading the program to accommodate the new requirements of the users and to correct errors in the program.

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Q22: What is documentation?

DOCUMENTATION

Documentation is the written information about the program. It provides information about a program, its logic and how it should be used. The instructions are written in the program for the help of users to operate and understand the program easily

LONG QUESTIONS

Q1: What is flowchart? Explain its different symbols.

Flowchart:

It is the pictorial representation of an algorithm.

Flowchart Symbols:

A flowchart is usually drawn using some standard symbols. The standard symbols which are frequently used in flowcharting are described below.

Flow Lines

The line with an arrow head represents the direction of flow of information in the flowchart between various blocks.

Start / End

An oval shape symbol is used to represent the start as well as end of a flowchart.

Input / Output

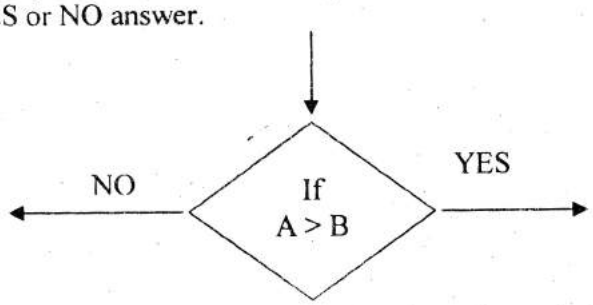
A parallelogram symbol is used in flowchart to show the input / output operation.

Process

A rectangular block is used to represent processing or computation.

Decision

A diamond symbol is used for making decision or selection in the flowchart. This symbol has one entry and two or more exits paths. A decision box may contain a simple question with YES or NO answer.



Connector

A connector symbol is represented by a small circle. It is used to join various part of a flowchart. The connector symbol is used when a flowchart exceeds from one page. A numeral is written inside the circle to identify the position where the connector joins or leaves the flowchart.

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Off page / On page connector

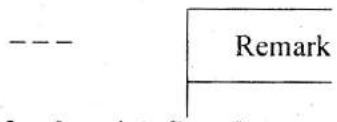
This symbol is used for a lengthy flowchart that does not fit on a single page. This symbol shows the continuity of flowchart to next page. The symbol of off-page / on-page is given below.

Pre-defined process

This symbol is used to call a function or subroutine in the main program to perform a specific task. The symbol of pre-defined process is given below.

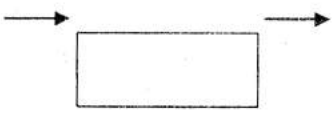
Remarks

The remarks or comme in the flowchart. The symbol for remarks or comments is given below.

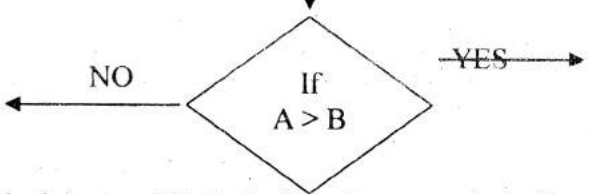


Q2: Write rules for drawing flowchart.

1. All necessary requirements should be written in logical order before to draw a flowchart.
2. The flowchart should be clear, neat and easy to follow. There should not be any problem in understanding the flowchart.
3. The flow of data or control should by from top to bottom or left to right.
4. Only one flow line should come out from a process symbol.



5. Only one flow line must be entered into a decision symbol and two flow lines must be come out from it. One line for True answer and other for False answer.



6. The logical start and End of a flowchart must be indicated with terminal symbol.

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EXERCISE

Q1: Fill in the blanks.

(i)	Program	(ii)	Syntax
(iii)	Pictorial	(iv)	Finite
(v)	Analysis	(vi)	Errors
(vii)	Implementation	(viii)	Runtime

Q2: Choose the correct answer.

(i)	A	(ii)	D
(iii)	A	(iv)	D
(v)	C	(vi)	B
(vii)	C	(viii)	C
(ix)	B	(x)	D

Q3: Write T for True and F for False statement.

(i) F		(ii)	F
(iii)	T	(iv)	T
(v)	F	(vi)	T
(vii)	F	(viii)	F
(ix)	T		

Q4: What do you mean by problem solving? Briefly describe the problem solving process?

PROBLEM SOLVING METHOD

Problem solving is a skill which can be developed by following a well organized approach. Programming is also a problem solving activity. Programmers use the problem solving method. The following steps can be followed to solve any kind of problem.

1. Problem identification
2. Specify requirements
3. Analyze the problem
4. Design algorithm and Draw flowchart
5. Write the program
6. Test and Debug the program
7. Implement the program
8. Maintain and update the program
9. Document the program

1. Problem Identification

In this stage, the problem being solved is observed carefully, so that problem can be understood and major tasks to perform for solution of problem can be identified. The irrelevant information is filtered out.

2. Specifying Requirements

In this stage the user's requirements are collected after understanding the problem clearly so that a proper solution of the problem could be decided. Most of the users cannot explain their exact software requirements. So many difficulties may occur for solving the problem.

3. Analyze the problem

The process of understanding the problem for developing its solution is called the analyzing the problem. It is very important stage in developing the solution of problem.

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In analyzing the problem stage, the main problem is divided into sub problems so that each sub problem can be solved easily one by one. This technique is called Top Down Design and also called Divide and Conquer Rule.

In analyzing the problem stage, following points may be noted.

1. How the given problem is solved?
2. How many solutions are possible for the solution of the problem?
3. Which one is the best solution?
4. Can the problem be solved on computer?
5. What are input and output?
6. How can the bigger problem be divided into sub problems?

4. **Design Algorithm and Draw Flow chart**

Once the problem is defined and analyzed, a general solution of the problem is prepared by giving a sequence of steps. The step by step procedure for the solution of the problem is called algorithm. The algorithm shows the steps and the order in which these steps are to be taken for the solution of the problem. After designing of algorithm it is converted into flowchart. Flowchart is the pictorial representation of an algorithm.

5. **Write the program**

In this phase, the algorithm is converted into a computer program. The computer program is written in any programming language. The programmer writes the program in programming language by following the algorithm or flowchart. The programmer writes the program according to the syntax of specific programming language.

6. **Test and Debug the program**

After writing the computer program, it is tested to verify that whether it works as desired. The program is tested by giving a test data. Test data is a data whose result is known in advanced. If there is any error occurs during testing then it must be debugged.

The process of finding and removing the errors is called debugging.

7. **Implement the program**

Once the program has been tested thoroughly, It must be installed or put into operation at the site where it will be used. This is known as implementation of the program.

8. **Maintain and Update the program**

Program maintenance is a process of upgrading the program to accommodate the new requirements of the users and to correct errors in the program.

9. **Document the program**

Documentation is the written information about the program. It provides information about a program, its logic and how it should be used. The Instructions are written in the program for the help of users to operate and understand the program easily.

Q5: What is debugging? How many types of errors can occur in program describe briefly?

DEBUGGING:

The process of finding and removing the error in a program is called debugging.

Syntax Error

The errors occur when grammatical rules of programming language are not followed in writing the computer program. These types of errors are detected at compile time of the program. For example

C = A + / B

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Logical Error

These errors may be due to improper use of the formula or wrong use of the symbols or data for if we write the formula for speed as

V = S X T

Instead V = S / T

The computer is unable to detect such errors and give out wrong result. Logical errors are difficult to find.

Runtime Error

The errors that are occurred during the execution of program is called runtime error. For example if a program contains a division of a number by zero. In such case the execution of the program stop during execution.

Q6: Define algorithm. Write a step-form algorithm for making a telephone call to your friend.

Algorithm:

The step by step procedure for the solution of problem is called algorithm.

Algorithm for making a telephone call to your friend

Step 1: Put up your telephone receiver.
Step 2: Check whether the telephone set is in working order. If telephone is in working order then follow step-3, otherwise follow step-10
Step 3: Dial the number of your friend.
Step 4: Note the response from other end.
Step 5: If somebody replies then follow step-8
Step 6: If no reply it means that nobody is present to attend the call. In this case follow step-10
Step 7: If number is busy then repeat step-3 to step-6 again after waiting.
Step 8: Ask about your friend.
Step 9: If your friend is not available then leave the message for him. If available then talk to him.
Step 10: Put down the receiver over the telephone set.

Q7: What are the advantages of flowchart? Discuss limitation of flowchart.

Advantages of flowchart

1. The logic of an algorithm can be described more effectively with the help of a flowchart.
2. Maintenance of operational programs becomes easy.
3. The flowchart act as a guide for the program development.
4. The flowchart helps in debugging process.

Limitation of flowchart

1. It is difficult to draw flowcharts for complex problems.
2. If alterations are required the flowchart is to be redrawn.

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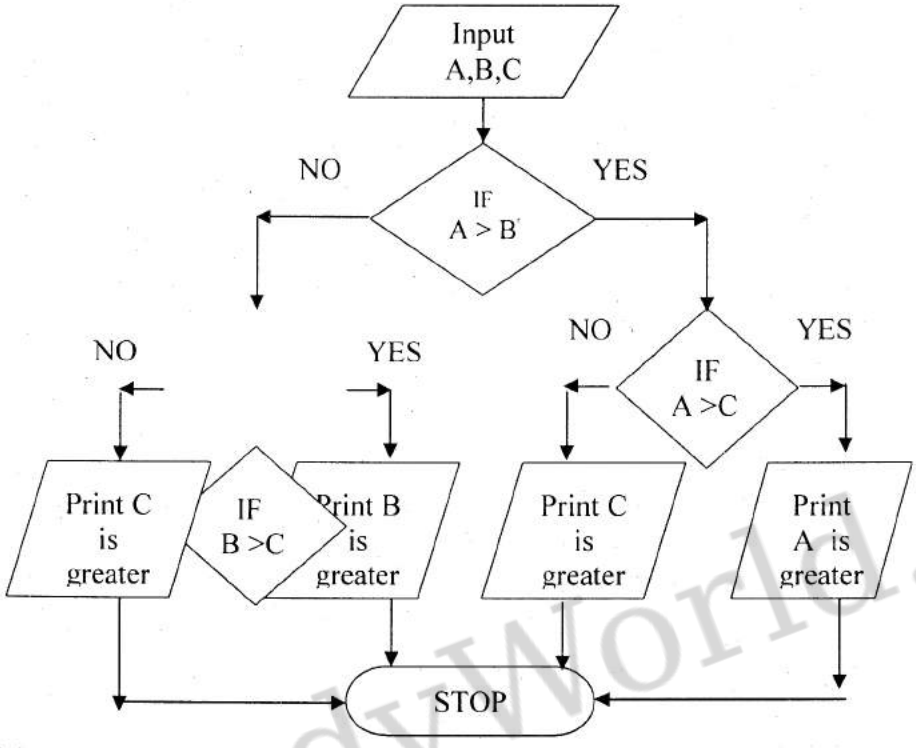
Q8: Draw a flowchart to find the largest of three numbers.



Q9: Write an algorithm o calculate the area of a circle when the radius is given.

Step 1: To find the area of circle take the radius of a circle which is denoted with the variable R.

Step 2: Multiply R with R and it is called P so

P = R x R

Step 3: Multiply P with the value 3.14 and it is called A so

A = 3.14 x P

Step 4: The area of circle is "A"

Q10: Answer the following short questions:

(i) List down the steps should be followed to solve a problem.

1. Problem identification
2. Specify requirements
3. Analyze the problem
4. Design algorithm and draw flow chart
5. Write the program
6. Test and debug the program
7. Implement the program
8. Maintain and update the program
9. Document the program

(ii) What is analysis? Describe its importance to solve a problem.

The process of understanding the problem for developing its solution is called the analyzing the problem. It is very important stage in developing the solution of the problem.

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(i) What method should be adopted to solve complex problems? Discuss briefly.

Write the step by step procedure to solve the complex problems. For large problems, don't attempt to solve every last detail of the problems at the beginning. Use a top down design that is divide the large problem into small problems.

(iv) What is mean by syntax of a programming language?

The grammatical rules to write the computer program are known as syntax of the programming language.

(v) What is the difference between logical and runtime error?

LOGICAL ERRORS	RUNTIME ERRORS
1. Logical errors may be due to improper use of formula or wrong use of the symbols or data.	1. The error that are occurred during the execution of program.
2. A computer cannot detect such errors and thus give out wrong results.	2. The language processors automatically point out these errors.
3. To detect logical errors, we run the program with test data.	3. Runtime errors are detected and displayed by the computer during the execution of a program.
4. When a logical error is found, it is removed by marking necessary changes in the program.	4. When a runtime error occurs, the computer will stop executing, the program and may display diagnostic message that helps in locating the error.

(vi) Why documentation is considered vital in problem solving process? Give reason.

Documentation helps the user to operate and understand the program easily. It also describes how input is identified in the program and how the output is formatted. The documentation also provides the instructions for the user to install the program, requirement of operating system and the hardware for running the program.

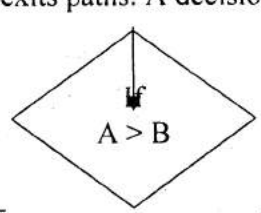
(vii) Is it necessary for an algorithm to solve a problem in finite number of steps? If yes, why?

Yes it is necessary for an algorithm to solve a problem in finite number of steps. An algorithm to solve a problem has a finite number of steps. At the end of execution of algorithm, the problem muse be solved.

(viii) Write purpose of the following flowchart symbols:

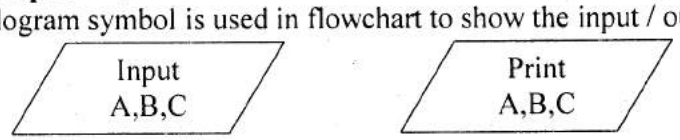
Decision

A diamond symbol is used for making decision or selection in the flowchart. This symbol has one entry and two or more exits paths. A decision box may contain a simple question with YES or NO answer.



Input / Output

A parallelogram symbol is used in flowchart to show the input / output operation.



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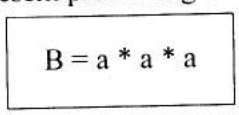
Connector

A connector symbol is represented by a small circle. It is used to join various part of a flowchart. The connector symbol is used when a flowchart exceeds from one page. A numeral is written inside the circle to identify the position where the connector joins or leaves the flowchart.

Process

A rectangular block is used to represent processing or computation.



Off page / On page connector

This symbol is used for a lengthy flowchart that does not fit on a single page. This symbol shows the continuity of flowchart to next page. The symbol of off-page / on-page is given below.

Pre-defined process

This symbol is used to call a function or subroutine in the main program to perform a specific task. The symbol of pre-defined process is given below.

(ix) Compare flowchart and algorithm.

The step-by step procedure is for the solution of problem is called algorithm. It accomplishes the task in finite set of steps. Flow chart is the pictorial representation of an algorithm. The description of each step is shown by a geometrical figure and the sequence in which the steps are to be executed is indicated by arrow lines joining the appropriate figures.

(x) Write an algorithm to calculate the distance covered by a car moving at an average speed of v ms^{-1} in time t. The program should input average speed v and time t.

Step 1: To find the distance covered by a car take the velocity which is denoted with V.
Step 2 : Take the time which is denoted with the name T.
Step 3 : Multiply V with T and we get the s so
S = V x T
Step 4 : The distance covered by a car is "S".

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